DVO | ANAEROBIC DIGESTERS

Application of Anaerobic Digestion, Nutrient Recovery and Biogas Scrubbing to Poultry Facilities

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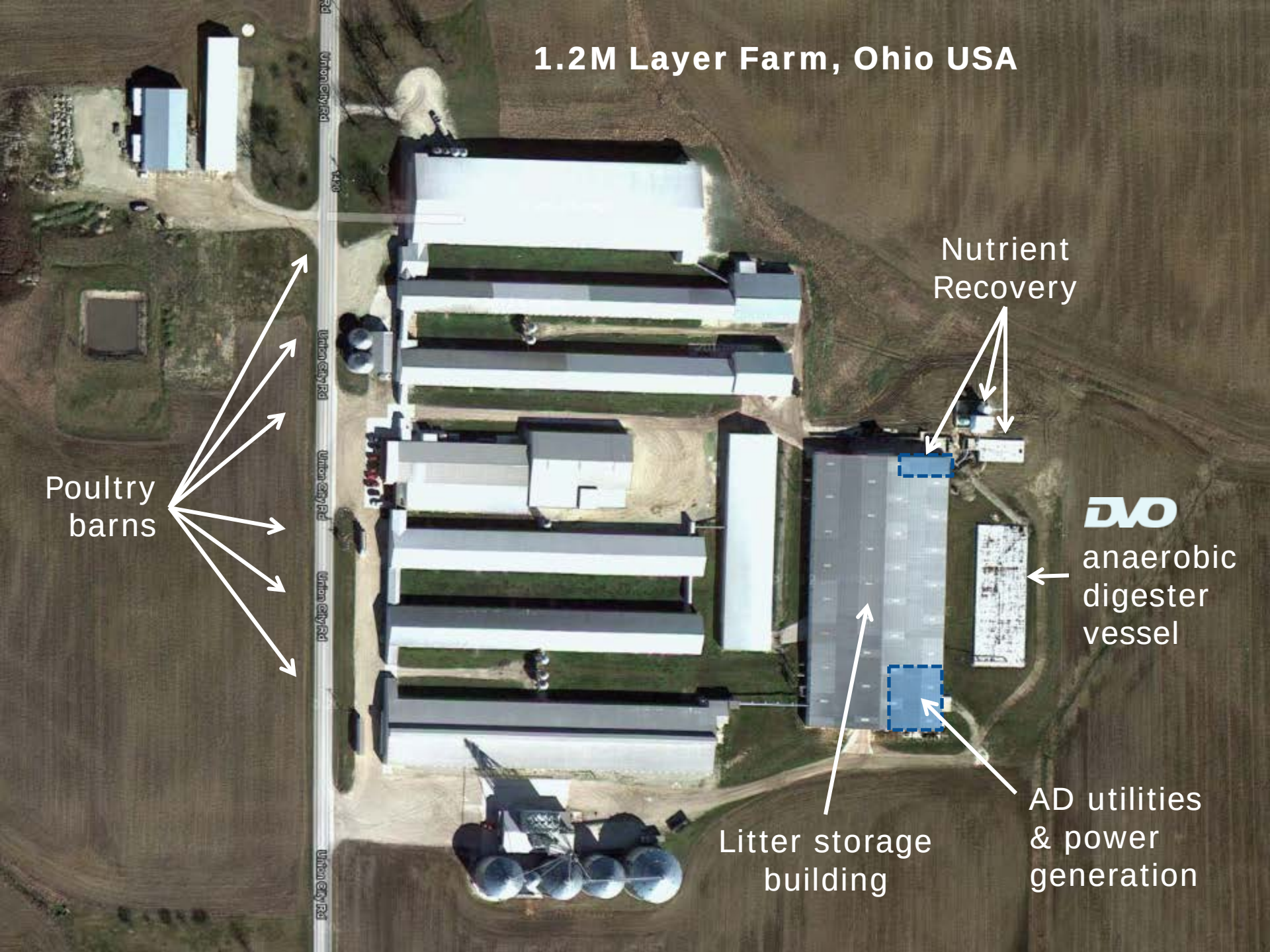
BACKGROUND

- +400 large-scale egg laying operations in US (> ½ million layers)
- Composting and/or gasification seen as existing and future manure management approaches for layer manure
  - Concerns exist regarding odor, energy balance, ammonia utilization/release, and economic return
- Slurry anaerobic digestion historically seen as non-viable due to large water requirement (40-50% TS) and biological toxicity of high ammonia concentrations (~5-8 g TAN-N/L)


1.2M Layer Farm, Ohio USA
Nutrient Recovery
Poultry barns
DVO
anaerobic digester vessel
Litter storage building
AD utilities & power generation

MANURE SOLIDS

60 tons poultry solids per day mixed with 80,000 gallons of recycled effluent

MIXING PIT

The loader feeds the fresh litter to the digester, where it is mixed with recycled effluent to provide the desired dilution for the AD system.

ANAEROBIC DIGESTER

Unlike other designs (such as the Complete-Mix/CSTR) the DVO digester retains and fully processes each unit of waste for a fixed period of time.

AMMONIA STRIPPING

Patent pending, non-chemical stripping process converts soluble ammonium to ammonia gas that leaves the reactor for the production of fertilizer.

AMMONIUM SULFATE FERTILIZER

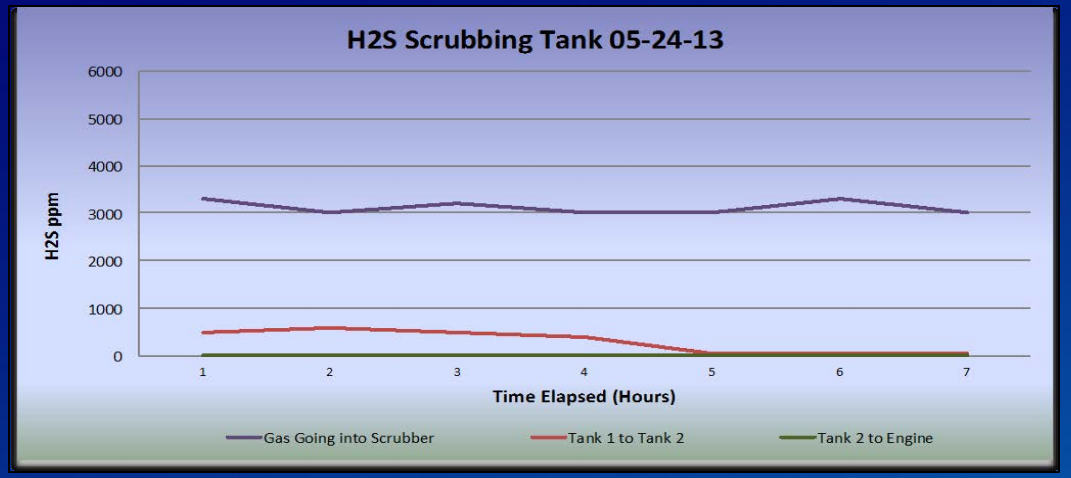
Ammonia gas is contacted with concentrated acid to produce a 40% ammonium sulfate fertilizer solution with a NPKS of 8:0:0:10

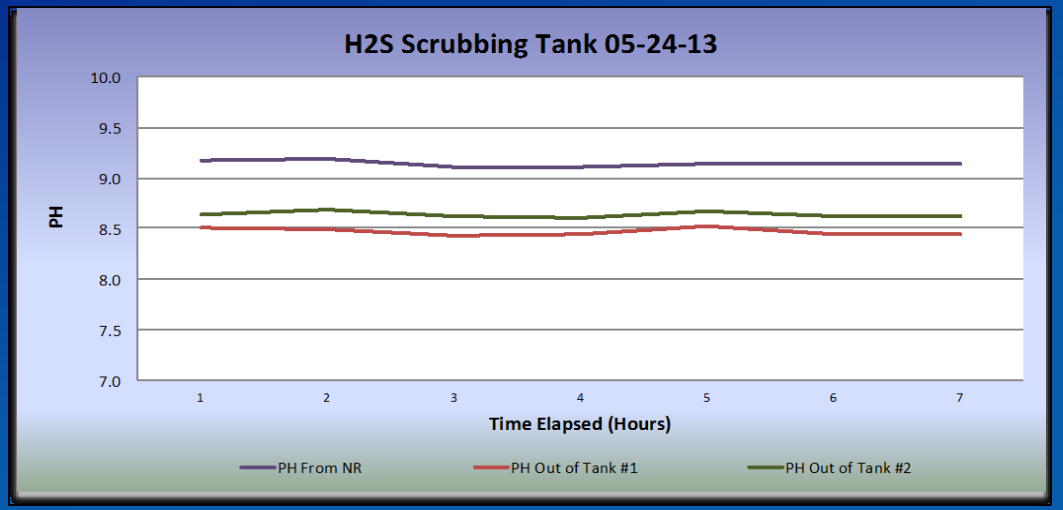
Produces about 10-12 tons of liquid fertilizer solution per day.

BIOGAS SCRUBBING*

High pH effluent can be subsequently used in the scrubbing of hydrogen sulfide and even carbon dioxide from the raw biogas.

*Biogas scrubbing demonstration not at the poultry facility





DAF/SOLIDS REMOVAL

CentriFlo separator followed by Modified Dissolved Air Floatation (DAF)

85-90% P reductions for < $0.002 USD/gal or € 0.32 per M^3 Processed. Total solids reduced to 1-2%.

MISCELLANEOUS

Entire system is controlled automatically, requiring only limited operational labor.

Heat exchangers used to best utilize available heat throughout system.

NEXT STEPS

- System improvements continue, aiming to:
  - Increase ammonia recovery
  - Reduce ammonia and total system costs
  - Optimize recycle/water/heat balances
  - Develop new markets for fertilizer products
- International and national sales on-going for next generation system
- Continued R&D with Washington State University to improve system efficiencies and ultimately condition biogas for CNG

American biogas Council

DVO | ANAEROBIC SYSTEMS

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